

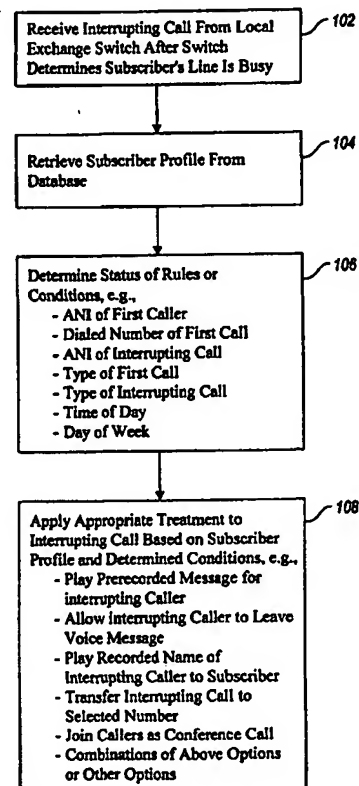
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(54) Title: METHOD AND APPARATUS FOR ENHANCED CALL WAITING IN A TELECOMMUNICATIONS NETWORK**(57) Abstract**

In a telecommunications network, a subscriber receives or places a first call to a first caller. Thereafter, during the first call, an interrupting caller attempts to call the subscriber. A local exchange switch routes the interrupting call to an automated response unit (ARU). The ARU receives the interrupting call and retrieves a subscriber profile from a database. The ARU also determines a status of rules or conditions, such as the ANI of the first or interrupting callers, the type of first or interrupting call, etc. The ARU provides an appropriate treatment to the interrupting call based on the subscriber profile and the determined conditions, such as playing a prerecorded message for the interrupting caller and allowing the interrupting caller to leave a voice message, and thereafter replaying a portion of the voice message to the subscriber during the first call. Calls can also be transferred to other numbers, the interrupting caller can join the first caller in a conference call, as well as various other described options.

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METHOD AND APPARATUS FOR ENHANCED CALL WAITING
IN A TELECOMMUNICATIONS NETWORK

TECHNICAL FIELD

The present invention relates to communication systems, including a
5 telecommunications network.

BACKGROUND OF THE INVENTION

Most telecommunications providers continually strive to provide additional services and features for subscribers. One such service, call waiting, allows a subscriber of the service to place a current call on hold and answer an interrupting call.
10 Call waiting is typically implemented as a beep or tone that is transmitted from the subscriber's local exchange switch to the speaker of their phone. The tone is transmitted from the local exchange switch to the subscriber when the subscriber's line is in use and another caller tries to call that same line. The subscriber can then place the first caller on hold and be connected to the interrupting call via a quick actuation of the
15 hook switch ("a flash-hook"). Subsequent flash-hooks alternate the subscriber between the original caller and the interrupting caller.

When the subscriber hears the tone, he or she has no indication as to who the interrupting caller is. As a result, the subscriber may interrupt an important call to be connected to an unimportant call, or vice versa. Additionally, the first caller, as well
20 as the subscriber, can be annoyed by the beep which interrupts the first call.

When the interrupting caller calls the subscriber, he or she has no indication that the line is currently busy, since he or she simply hears a ringing signal. Therefore, unless the subscriber quickly flash-hooks, interrupting callers often hang up because they believe that there is no answer at the subscriber's line.

25 To avoid this problem, the subscriber must temporarily disable his or her call waiting feature by dialing a specific sequence of dual tone multifrequency (DTMF) digits before placing a call (e.g., *70). As a result, once a call is in progress, or if the subscriber answers an incoming call, he or she cannot disable the call waiting feature. Once the subscriber places a call, however, the subscriber cannot reenable the call

waiting feature. Additionally, the subscriber must remember to disable call waiting if he or she wishes not to be interrupted during a call.

SUMMARY OF THE INVENTION

The present invention enhances call waiting services by providing certain modifications to the interrupting call and providing of options to the subscriber. Under an exemplary embodiment of the invention, a subscriber receives or places a first call to a first caller. Thereafter, during the first call, an interrupting caller attempts to call the subscriber. A local exchange switch routes the interrupting call to an automated response unit (ARU). The ARU receives the interrupting call and retrieves a subscriber profile from a database. The ARU also receives additional information, such as the ANI of the first or interrupting callers, the type of first call or interrupting call, etc. The ARU provides an appropriate treatment to the interrupting call based on the subscriber profile and the determined conditions, such as playing a prerecorded message for the interrupting caller and allowing the interrupting caller to leave a voice message, and thereafter replaying a portion of the voice message to the subscriber during the first call. Calls can also be transferred to other numbers, the interrupting caller can join the first caller in a conference call, as well as various other exemplary options described herein.

Broadly stated, the present invention embodies a computer-implemented method in a network having a network user engaged in a first transmission and receiving an interrupting transmission for the user. The method includes the steps of: (a) determining that the user is engaged in the first transmission; (b) retrieving a previously established set of instructions for responding to interrupting transmissions; (c) receiving additional data regarding the first or interrupting transmission; and (d) applying a treatment to the interrupting transmission based on the set of instructions and the additional data.

The present invention also embodies a method performed in a telecommunications network having a subscriber engage in a first call and receiving an interrupting call for this subscriber at a local exchange switch. The method includes the steps of: (a) determining at the local exchange switch that the subscriber is engaged in

the first call; (b) retrieving a previously established subscriber profile; and (c) applying a treatment to the interrupting call based on the subscriber profile.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a portion of a telecommunications network, including an automated response unit.

Figure 2 is an exemplary flowchart diagram of a method for providing call waiting services under the present invention.

DETAILED DESCRIPTION OF THE INVENTION

A telecommunications network, and in particular, a method and apparatus for providing call waiting services in the network, is described in detail herein. In the following description, numerous specific details are set forth such as rules for handling calls, ordering and execution of steps, etc., in order to provide a thorough understanding of the present invention. One skilled in the relevant art, however, will readily recognize that the present invention can be practiced without use of the specific details described herein, or with other specific steps in a routine, options for handling interrupting calls, *etc.* Well-known structures and steps are not shown or described in detail in order to avoid obscuring the present invention.

Referring to Figure 1, a simplified telecommunications system is shown that includes a telephone of a subscriber ("subscriber 12"), which is coupled to a local exchange switch 14. The subscriber 12 is serviced by one or more lines 24 from the local exchange switch 14. The subscriber 12, through the local exchange switch 14, an interexchange switch 16, and another local exchange switch 18, places or receives a first call 20 with a first caller. While the subscriber 12 is busy on the first call 20, an interrupting caller serviced by the local exchange switch 14, places an interrupting call to the subscriber 12. Alternatively, an interrupting caller, serviced by the another local switch 18, places another interrupting call 22' to the subscriber 12 through the interexchange switch 16 and local exchange switch 14. While the following discussion

generally discusses the interrupting call 22 placed by the first interrupting caller, the following discussion applies equally to the other interrupting call 22'.

As generally used herein when describing the below exemplary embodiment, the terms "first call 20" and "first caller 20" are used interchangeably, and refer to a party or device with which the subscriber 12 is currently connected when a new (interrupting) call is received. Either the subscriber 12 or the first caller 20 could have initiated the first call. Similarly, the term "subscriber 12" is a customer or user of the telecommunications system 10 who typically is paying for the service provided under an embodiment of the present invention. Additionally, as used generally herein when describing the below exemplary embodiment, the terms "interrupting call 22" and "interrupting caller 22" are used interchangeably, and refer to a call to the subscriber 12 which is received during the first call 20.

When the interrupting caller places the interrupting call 22 to the subscriber 12, the telecommunications network 10 routes the call to the local exchange switch 14 which services the subscriber 12. The local exchange switch 14 determines that the line 24 to the subscriber 12 is busy, and in response thereto, routes the call over a special trunk group 26 to an automated response unit ("ARU") 30. The ARU 30 (described more fully below) may also be coupled to other local exchange switches, such as local exchange switch 14', shown in broken lines.

A release link capability device, such as a release link trunk (RLT) (not shown) selectively couples the local exchange switch 14 to the ARU 30 through the trunk 26. A "release link capability" is the ability of an originating switching system, on receipt of a new destination address (*e.g.*, phone number) from the current terminating switch system, to release the transmission link to that terminating switching system and continue call processing using the new destination address. RLTs are standard technology in many telecommunications switches, such as local switches manufactured by ATT or Northern Telecom, which allows a switch to release a call from its current termination and reconnect the call to another termination, without terminating the call.

As used generally herein, an ARU is any technology which permits a caller to interact with a computer. Such interaction could be via voice interaction, flash-hooks, dialing digits (DTMF), etc. The ARU 30, also known as a voice response unit (VRU) or interactive voice response (IVR), includes a processor and memory and can include an audio server that accepts voice/fax calls on a telephony port, records, stores and plays recorded audio messages and menus for a caller, prompts a caller for input (voice, flash-hooks, DTMF digits, etc.), and collects caller input. The ARU 30 also preferably consists of an automated call processor, typically a computer, that performs intelligent processing of calls. As described in more detail below, the automated call processor of the ARU 30 determines which menu to offer the interrupting caller 22 when the line 24 is busy, or which menu to offer the subscriber 12 during setup or modification of the subscriber's system. The audio server also collects input from callers, such as DTMF digits, voice recognition input, or other input provided by the caller, as noted below. Based on such input, the automated call processor of the ARU 30 determines subsequent processing of a call. The ARU 30 could also simply be one or more computers with their own associated storage devices for storing the audio messages, database of subscriber profiles (described below), etc.

The ARU 30 also preferably contains, or has access to, a database of subscriber profiles. A subscriber profile specifies how the subscriber wishes the ARU to handle interrupting calls. As described in more detail below, the ARU 30, based on a given profile, may play prerecorded menus to the interrupting caller 22, allow the caller to record messages, automatically route the call, etc.

Upon determining that the line 24 is busy, the local exchange switch 14 routes not only the interrupting call 22 but also additional data to the ARU 30. Such additional data can include the automatic number identification ("ANI") of the interrupting call 22, the dialed number which was previously dialed by the subscriber 12 to the first caller 20, the ANI of the first call, information digits, etc. As is known, information digits indicate classifications of callers, sites or equipment, such as pay phones, hospitals, etc. Such additional data is provided to the ARU 30 by either

in-band signaling, such as digit outpulsing, or out-of-band signaling, such as signaling system 7 (SS7). All of such additional data is useful for call screening features, as described below.

Due to the special trunk 26 coupled between the ARU 30 and the local exchange switch 14, the local exchange switch knows that all calls originating from the ARU 30 are "special" calls. As a result, the local exchange switch 14 does not handle the call as simply another interrupting call. Alternatively, the ARU 30 can provide a special indicator or signal with a call originated by the ARU so that the local exchange switch 14, in response thereto, treats such calls unlike typical interrupting calls. The local exchange switch 14 optionally provides an appropriate special indicator to the subscriber 12, such as a tone or recorded voice message, during the call with the first caller 20.

Referring to Figure 2, a routine 100 performed by the ARU 30 determines how the interrupting call 22 is handled. Those skilled in the relevant art can create source code based on the flowchart of Figure 2 and the detailed description provided herein. The routine 100 is preferably stored in memory (not shown) that forms part of the ARU 30.

In step 102, the ARU 30 receives the interrupting call 22 from the local exchange switch 14, after the local exchange switch determines that the subscriber 12's line 24 is busy. In step 104, the ARU 30 retrieves the subscriber profile for the subscriber 12 which is stored in the subscriber profile database. A subscriber profile is a previously established and stored list of contingent plans selected by the subscriber 12 or the ARU 30. The subscriber profile instructs the ARU 30 how to automatically handle certain interrupting calls, as described in more detail below with respect to step 108.

In step 106, the ARU 30 receives additional data and determines conditions or rules, which together with the subscriber profile, determine how the ARU handles the interrupting call 22. The additional data and conditions include:

- (a) The ANI of the first caller 20;

- (b) The dialed number of the first call, as placed by the subscriber 12;
- (c) The ANI of the interrupting call 22;
- (d) The first call type, *e.g.*, whether the first call is a local, long-
5 distance, toll-free, outbound, inbound, calling card, or other type
of call;
- (e) The interrupting call type;
- (f) The current time of day;
- (g) The current day of the week; etc.

10 In step 108, the ARU 30 applies an appropriate treatment to the
interrupting call 22 based on the retrieved subscriber profile and the determined
conditions or other received data. Exemplary treatments or handling of the interrupting
call 22 include: (1) allowing the interrupting caller to leave a recorded voice message
for the subscriber 12; (2) allowing the interrupting caller to leave a voice message, and
15 notifying the subscriber during the first call that the message has been recorded;
(3) playing a prerecorded message for the interrupting caller; (4) allowing the
interrupting caller to remain on hold; (5) rerouting the interrupting call to another
destination; (6) allowing the interrupting caller to interrupt the first call; etc.

Considering first option (1), the ARU 30 replays a prerecorded message
20 (recorded by either the subscriber 12 or other person) which instructs the interrupting
caller 22 to leave a voice message (voice mail) after a tone. The ARU 30 then records a
voice message from the interrupting caller. Both the prerecorded message replayed by
the ARU 30, and the recorded message from the interrupting caller 22 are stored in
memory within the ARU. Alternatively, if the subscriber 12 has a voicemail service
25 with the telecommunications system 10 or elsewhere, the ARU 30 simply transfers the
interrupting call 22 to the appropriate voicemail system (not shown). The interrupting
caller's message is then recorded at the appropriate voice mail system.

Considering option (2), in addition to permitting the interrupting caller
22 to leave a voice message for the subscriber 12, the ARU 30 interrupts the subscriber

with a notification that a recorded voice message exists (from the interrupting caller 22). The notification can be in the form of a tone, prerecorded voice message from the ARU 30, or short greeting recorded by the interrupting caller 22. In response thereto, the subscriber 12 performs an appropriate input (*e.g.*, DTMF digit input, flash hook, etc.), after which the ARU 30 plays back the message for the subscriber. While the message is played back, the first caller 20 is placed on hold. Alternatively, the first caller 20 is not placed on hold, but the recorded message from the interrupting caller is played back to the subscriber 12 during the first call, with or without the first caller being able to hear the message.

10 Under option (3), the ARU 30 replays a prerecorded message to the interrupting caller 22. All prerecorded messages could be standard messages established for the ARU 30, or be personal messages prerecorded by the subscriber 12. Such personal prerecorded messages from the subscriber 12 are established and stored in the subscriber's profile, as described below.

15 Under option (4), the ARU 30 allows the interrupting caller 22 to remain on hold until the subscriber 12 has completed the call with the first caller 20, thereby "camping" on the subscriber's line 24. When the subscriber 12 completes the first call 20, the local exchange switch 14 detects the release of the subscriber's first call from the line 24. The local exchange switch then releases the interrupting caller 22 from the ARU 30, using release link capability technology, to connect the interrupting caller with the subscriber 12. Alternatively, the ARU 30 transfers the interrupting caller 22 to the local exchange switch 14, which holds the interrupting caller thereon, thereby freeing up a port on the ARU. The ARU 30 provides a tone or message to the subscriber 12 indicating that an interrupting call is currently on hold. Prior to placing the interrupting caller 22 on hold, the ARU 30 can ask the interrupting caller to speak his or her name, which is recorded and then replayed for the subscriber to indicate to the subscriber who is currently on hold.

Under option (5), the ARU 30 can reroute the interrupting caller 22 to another destination, *e.g.*, another POTS number. The other number can be the number

of an answering service. Alternatively, the rerouting of the interrupting caller 22 can be to another line of the subscriber. Thus, if employed in the subscriber's home, someone else in the subscriber's home can answer the interrupting call, while the subscriber 12 remains on the line with the first caller 20. The other number can also be the number
5 having a voicemail account on another system, fax machine, etc. If the subscriber 12 has multiple alternative numbers to which the interrupting caller 22 can be routed, the ARU 30 provides the subscriber 12 with a menu or options of numbers to which the interrupting caller can be routed. Alternatively, the subscriber profile stored in the ARU 30 can automatically reroute the interrupting caller based on the caller's ANI, or
10 other criteria established by the subscriber database (*e.g.*, to an answering service on weekends or after business hours).

Under option (6), the ARU 30 requests the interrupting caller 22 to speak his or her name, which is recorded by the ARU. The ARU 30 then plays a tone to the subscriber 12, indicating to the subscriber that another caller is waiting. The
15 subscriber 12 via DTMF input, flash-hook input, or other means, plays back the interrupting caller's recorded name, preferably to only the subscriber 12, so that the first caller 20 cannot also hear the name. Thereafter, the ARU 30 provides the subscriber 12 with several options for handling the interrupting caller 22. These options can be played back as a voice message to the subscriber 12. The options, performed by the
20 ARU 30, include:

- (i) replaying a prerecorded message for the interrupting caller 22, and then transferring the caller to the voicemail server so that the caller can record a voice message for the subscriber;
- (ii) placing the first caller 20 on hold and accepting the interrupting
25 caller (as is currently performed with call waiting);
- (iii) joining the interrupting caller with the first caller as a conference;
- (iv) hanging up on the interrupting caller;
- (v) replaying a prerecorded message, and then hanging up on the interrupting caller;

(vi) replaying a prerecorded message and leaving the interrupting caller on hold, to be later accepted by the subscriber after finishing with the first caller;

(vii) replaying a prerecorded message and transferring the interrupting caller to a different number; and

(viii) replaying a prerecorded message of menu options for the interrupting caller, to permit the interrupting caller to decide whether to leave a voice message, continue to hold for the subscriber, to transfer to a different number (*i.e.*, another POTS number) (*e.g.*, to send a facsimile via a facsimile machine coupled to a different number), etc.

Options (vii) and (viii) are particularly valuable if the subscriber 12 has two or more lines such as in a home office or small office.

Multiple combinations of the above options are available. For example, the ARU 30 can replay a prerecorded message for the interrupting caller 22 under option (3), and then allow the caller to remain on hold under option (4). Combining options (1) and (6) noted above, the ARU 30 originates a call to the subscriber 12, via the local exchange switch 14, to allow the subscriber to play a recorded message of the interrupting caller's name.

The above options can be performed automatically based on preselected options in the subscriber's profile, or be enabled based on selections from a menu presented at the time of each interrupting call 22. Under the above options, the subscriber 12 selects, via DTMF digits, flash-hook, or other input, to listen to messages in response to initial prompts or indicator messages from the ARU 30. Alternatively, as noted above, the message can be replayed concurrently with the first call 20 (with or without the first caller being able to hear the message). The local exchange switch 14 can also place the first caller 20 on hold, and connect the ARU 30 to the subscriber 12 so that the subscriber can hear the message.

Under automatic handling of interrupting calls 22, the subscriber 12 establishes his or her subscriber profile in the subscriber profile database. The profile

can be established and modified by: (1) calling the ARU 30, (2) calling a special ARU (not shown) which is coupled to the ARU 30 and downloads data thereto, (3) calling a customer service center to talk with a customer service representative who in turn creates or modifies the profile in the ARU, (4) creating or modifying the profile by dialing into an Internet address, etc. The profile provides instructions to the ARU 30 for automatically handling interrupting calls 22 based on the conditions (a) through (f) noted above. For example, the subscriber 12 establishes in profile that if the first caller 20 is a long-distance call, the interrupting call 22 is immediately transferred to the voicemail system, after playing a prerecorded message indicating that the subscriber is currently on a long-distance call.

Additionally, the subscriber 12 preferably includes in the profile dialed numbers of Internet Service Providers (ISPs), or other dialed numbers for data modem calls. If, during such a call, the local exchange switch 14 routes the interrupting call 22 to the ARU 30, the ARU determines from the subscriber profile and from the dialed number provided by the local exchange switch, that the subscriber is currently engaged in a data modem call. Thus, the ARU 30 does not interrupt the first call 20 with even a tone indicator or other message to the subscriber 12 which can disrupt such calls. When the first call 20 is to an ISP, etc., the interrupting call 22 is routed to the voicemail system, or another preselection action is taken.

The subscriber 12 can also establish in his or her profile certain dialed numbers or ANIs which are never to be interrupted. Conversely, the subscriber 12 in his or her profile can establish ANIs or information digits (*e.g.*, information digits of hospitals, pay phones, etc.) which the subscriber will always accept in lieu of the first call 20. Furthermore, the ARU 30, through the local exchange switch 14, can sample or monitor the first call 20 on the line 24. If the first call 20 is a fax call (as determined by a sample of signals therefrom), the subscriber profile can indicate that such a fax transmission is not to be interrupted.

As noted above, the ARU 30 under certain options presents the interrupting caller 22 with a menu from which to decide whether to remain on hold,

leave a voicemail message, transfer to another number, etc. Similarly, the ARU 30 under certain options provides the subscriber 12 with a menu or options, from which the subscriber determines whether to accept the interrupting caller 22, transfer the interrupting caller to voicemail or another number, etc. The ARU 30 also provides the
5 subscriber 12 with the option of disabling call waiting. The subscriber 12 places a DTMF call to the ARU 30, provides DTMF digit input to access their account, and change their profile, which can be performed on a call-by-call basis. For example, if the subscriber 12 has call waiting enabled and configured to interrupt him during all calls, the subscriber can disable call waiting during which he or she does not wish to be
10 interrupted. Alternatively, he or she can disable call waiting prior to placing the call.

While the embodiment of the present invention is generally described above as including the separate ARU 30, the present invention could also reside within a computer integrated with the local exchange switch 14. Alternatively, the present invention can be embodied in a computer located at a subscriber's site, particularly if
15 the subscriber has a private branch exchange (PBX). As a result, such a subscriber located alternative could be a computer system configurable and residing at multiple subscriber locations within the telecommunications system 10.

While the embodiment of the present invention is generally described above with respect to one interrupting caller 22, the description is equally applicable to
20 a second interrupting caller 22' which may place a call to the subscriber 12 while the first interrupting caller 22 is communicating with the ARU 30. The second interrupting caller 22' is similarly routed, via the local exchange switch 14, to the ARU 30, which presents the same options as those presented to the first interrupting caller 22.

The embodiment of the present invention described herein is applicable
25 to various network systems, including wireless systems, personal communications systems (PCS), operator services, private networks, etc. While some local exchange switches 14 can readily communicate with the ARU 30 under the embodiments described above, some local exchange switches may require appropriate modifications,

such as modifications to accept and appropriately interpret calls and special indicator messages from the ARU.

While the above embodiments of the present invention can be provided to the subscriber 12 as a flat rate fee service, embodiments of the present invention can be provided on an "as they are used" basis. The more options or features which the subscriber 12 uses, the higher or greater billing rate for that subscriber, which provides a more competitive billing structure. Under such an alternative, the ARU 30 generates billing records for the telecommunications system 10 based on usage by the subscriber 12.

Although specific embodiments of, and examples for, the present invention are described herein for illustrative purposes, various equivalent modifications can be made without departing from the spirit and scope of the invention, as will be recognized by those skilled in the relevant art. The teachings provided herein of the present invention can be applied to other communications or network systems, not necessarily the exemplary telecommunications systems described above. For example, while the present invention as been generally described above as being employed in the telecommunications network 10, the present invention is equally applicable to other communication systems, such as a network of computers to provide signal or message waiting capabilities for first and interrupting transmission. While certain operations under the present invention have been described as occurring generally in a serial fashion, those skilled in the relevant art will recognize that it is entirely within the scope of the invention to conduct some operations more or less simultaneously, or even in reverse order, from that described herein.

These and other changes can be made to the invention in light of the above detailed description. In general, in the following claims, the terms used should not be construed to limit the invention to the specific embodiments disclosed in the specification and the claims, but should be construed to include any signal handling system that operates under the claims to provide options for handling interrupting

signals. Accordingly, the invention is not limited by the disclosure, but instead its scope is to be determined entirely by the following claims.

CLAIMS

I (we) claim:

1. In a telecommunication network having a subscriber engaged in a first call through a local exchange switch and, a method comprising the steps of:
receiving an interrupting call for the subscriber at the local exchange switch;
determining at the local exchange switch that the subscriber is engaged in the first call;
establishing a subscriber selected contingency profile;
retrieving the subscriber profile;
receiving additional data regarding the first or interrupting call; and
applying a contingency based on the subscriber profile and the additional data.
2. The method of claim 1 wherein the step of receiving additional data includes the step of receiving at least one of an ANI of the first call, an ANI of the interrupting call, a dialed number of the first call, a type of the first call, a type of the interrupting call, a time of day, a day of the week and information digits of the interrupting call.
3. The method of claim 1 wherein the step of retrieving includes the step of retrieving a prerecorded message being previously recorded by the subscriber and stored in the subscriber profile, and wherein the step of applying includes the step of playing the prerecorded message to the interrupting caller.
4. The method of claim 1 wherein the step of retrieving includes the step of retrieving a stored message previously stored by a telecommunications service provider, and wherein the step of applying includes the step of playing the stored message to the interrupting caller.
5. The method of claim 1 wherein the step of applying includes the steps of:

recording a message from the interrupting caller, including a name of the interrupting caller;

replaying the recorded name of the interrupting caller for the subscriber; and

receiving an input from the subscriber;

replaying the recorded message for the subscriber.

6. The method of claim 1 wherein the step of applying includes the steps of:

maintaining the interrupting caller on hold at the local exchange switch; and

notifying the subscriber that the interrupting caller is holding.

7. The method of claim 1 wherein the step of retrieving includes the step of retrieving the profile, wherein the profile includes a plurality of alternate phone numbers stored in the subscriber profile, and wherein the step of applying includes the step of:

providing a menu of the alternate phone numbers to the interrupting caller;

receiving an input from the interrupting caller; and

routing the interrupting call to one of the alternate numbers based on the received input.

8. The method of claim 1 wherein the step of applying includes the steps of:

providing a menu of options to the interrupting caller;

receiving an input from the interrupting caller; and

managing the interrupting call based on the received input.

9. The method of claim 1 wherein the step of applying includes the steps of:

notifying the subscriber of the interrupting caller;

receiving an input from the subscriber; and

joining the interrupting caller with the first call after receiving the input.

10. The method of claim 1, further comprising the steps of:
receiving subscriber input during the first call; and
preventing the interrupting call or other signal from interrupting the first call.

11. The method of claim 1, further comprising the steps of:
receiving first subscriber input;
providing a menu of options to the subscriber;
receiving a second subscriber input; and
modifying the subscriber profile based on the second subscriber input.

12. The method of claim 1 wherein the step of retrieving the subscriber profile includes retrieving a list of preselected numbers, wherein the step of receiving additional data includes receiving a number dialed for the first call, and wherein the step of applying includes the steps of:
comparing the dialed number to the list of numbers; and
prohibiting interruption of the first call if the dialed number matches one of the numbers in the list of numbers.

13. In a telecommunication network having a subscriber engaged in a first call and receiving an interrupting call for the subscriber at a local exchange switch from an interrupting caller, a computer-implemented method comprising the steps of:
determining at the local exchange switch that the subscriber is engaged in the first call;
retrieving a previously established subscriber profile;
receiving additional data regarding the first or interrupting call; and
applying a treatment to the interrupting call based on the subscriber profile and the additional data.

14. The method of claim 13 wherein the step of receiving includes the step of receiving at least one of an ANI of the first call, an ANI of the interrupting call, a dialed number of the first call, a type of the first call, a type of the interrupting call, a time of day, a day of the week and information digits of the interrupting call.

15. The method of claim 13 wherein the step of retrieving includes the step of retrieving a prerecorded message being previously recorded by the subscriber and stored in the subscriber profile, and wherein the step of applying a treatment includes the step of playing the prerecorded message to the interrupting caller.

16. The method of claim 13 wherein the step of retrieving includes the step of retrieving a stored message previously stored by a telecommunications service provider, and wherein the step of applying includes the step of playing the stored message to the interrupting caller.

17. The method of claim 13 wherein the step of applying a treatment includes the step of recording a message from the interrupting caller.

18. The method of claim 13 wherein the step of applying a treatment includes the step of maintaining the interrupting caller on hold at the local exchange switch.

19. The method of claim 13 wherein the step of retrieving includes the step of retrieving an alternate phone number previously selected by the subscriber and stored in the subscriber profile, and wherein the step of applying a treatment includes the step of routing the interrupting call to the alternate number.

20. The method of claim 13 wherein the step of applying a treatment includes the step of providing a menu of options to the interrupting caller.

21. The method of claim 13 wherein the step of applying a treatment includes the step of joining the interrupting caller with the first call.

22. The method of claim 13, further comprising the steps of:
receiving subscriber input during the first call; and
preventing the interrupting call or other signal from interrupting the first call.

23. The method of claim 13, further comprising the steps of:
receiving subscriber input; and
modifying the subscriber profile based on the subscriber input.

24. The method of claim 13, further comprising the step of performing the steps of retrieving, receiving and applying a treatment at the local exchange switch.

25. In a telecommunication network having a subscriber engaged in a first call and receiving an interrupting call for the subscriber at a local exchange switch, a computer-implemented method comprising the steps of:

determining at the local exchange switch that the subscriber is engaged in the first call;

retrieving a previously established subscriber profile; and
applying a treatment to the interrupting call based on the subscriber profile.

26. The method of claim 25 wherein the step of retrieving includes the step of retrieving a prerecorded message, and wherein the step of applying a treatment includes the step of playing the prerecorded message to the interrupting caller.

27. The method of claim 25 wherein the step of applying a treatment includes the step of recording a message from the interrupting caller.

28. The method of claim 25 wherein the step of applying a treatment includes the step of maintaining the interrupting caller on hold.

29. The method of claim 25 wherein the step of retrieving includes the step of retrieving an alternate phone number, and wherein the step of applying a treatment includes the step of routing the interrupting call to the alternate number.

30. The method of claim 25 wherein the step of applying a treatment includes the step of providing a menu of options.

31. The method of claim 25 wherein the step of applying a treatment includes the step of joining the interrupting caller with the first call.

32. The method of claim 25, further comprising the steps of:
receiving subscriber input during the first call; and
preventing the interrupting call or other signal from interrupting the first call.

33. In a network having a network user engaged in a first transmission and receiving an interrupting transmission for the user, a computer-implemented method comprising the steps of:

determining that the user is engaged in the first transmission;
retrieving a previously established set of instructions for responding to interrupting transmissions;
receiving additional data regarding the first or interrupting transmission; and
applying a treatment to the interrupting transmission based on the set of instructions and the additional data.

34. A computer-readable medium containing instructions for a computer in a network having a network user engaged in a first transmission and receiving an interrupting

transmission for the user, the instructions of the computer-readable medium comprising the steps of:

- determining that the user is engaged in the first transmission;
- retrieving a previously established set of instructions for responding to interrupting transmissions;
- receiving additional data regarding the first or interrupting transmission; and
- applying a treatment to the interrupting transmission based on the set of instructions and the additional data

35. In a telecommunications network having a local exchange switch that couples, as a first call, a subscriber with a first caller, an apparatus comprising:

- a memory storing a previously established profile for the subscriber; and
- a processor coupled to the memory and the local exchange switch, the processor (a) receiving from the local exchange switch an indication of an interrupting call for the subscriber, (b) retrieving the subscriber profile from the memory, and (c) applying a treatment to the interrupting call based on the subscriber profile.

36. The apparatus of claim 35, wherein the processor determines the treatment of the interrupting call and creates a billing record based on the determined treatment.

37. The apparatus of claim 35 wherein the processor retrieves a prerecorded message being previously recorded by the subscriber and stored in the memory, and replays the prerecorded message to the interrupting caller.

38. The apparatus of claim 35 wherein the processor retrieves a stored message being previously stored by a telecommunications service provider in the memory, and replays the stored message to the interrupting caller.

39. The method of claim 35 wherein the processor records a message from the interrupting caller.

40. The method of claim 35 wherein the processor maintains the interrupting caller on hold at the local exchange switch.

41. The apparatus of claim 35 wherein the processor retrieves an alternate phone number previously selected by the subscriber and stored in the memory and routes the interrupting call to the alternate number.

42. The apparatus of claim 35 wherein the processor provides a menu of options to the interrupting caller.

43. The apparatus of claim 35 wherein the processor joins the interrupting caller with the first call.

44. The apparatus of claim 35 wherein the processor receives subscriber input during the first call and prevents the interrupting call or other signal from interrupting the first call.

45. The apparatus of claim 35, wherein the processor and memory are located at and form part of the local exchange switch.

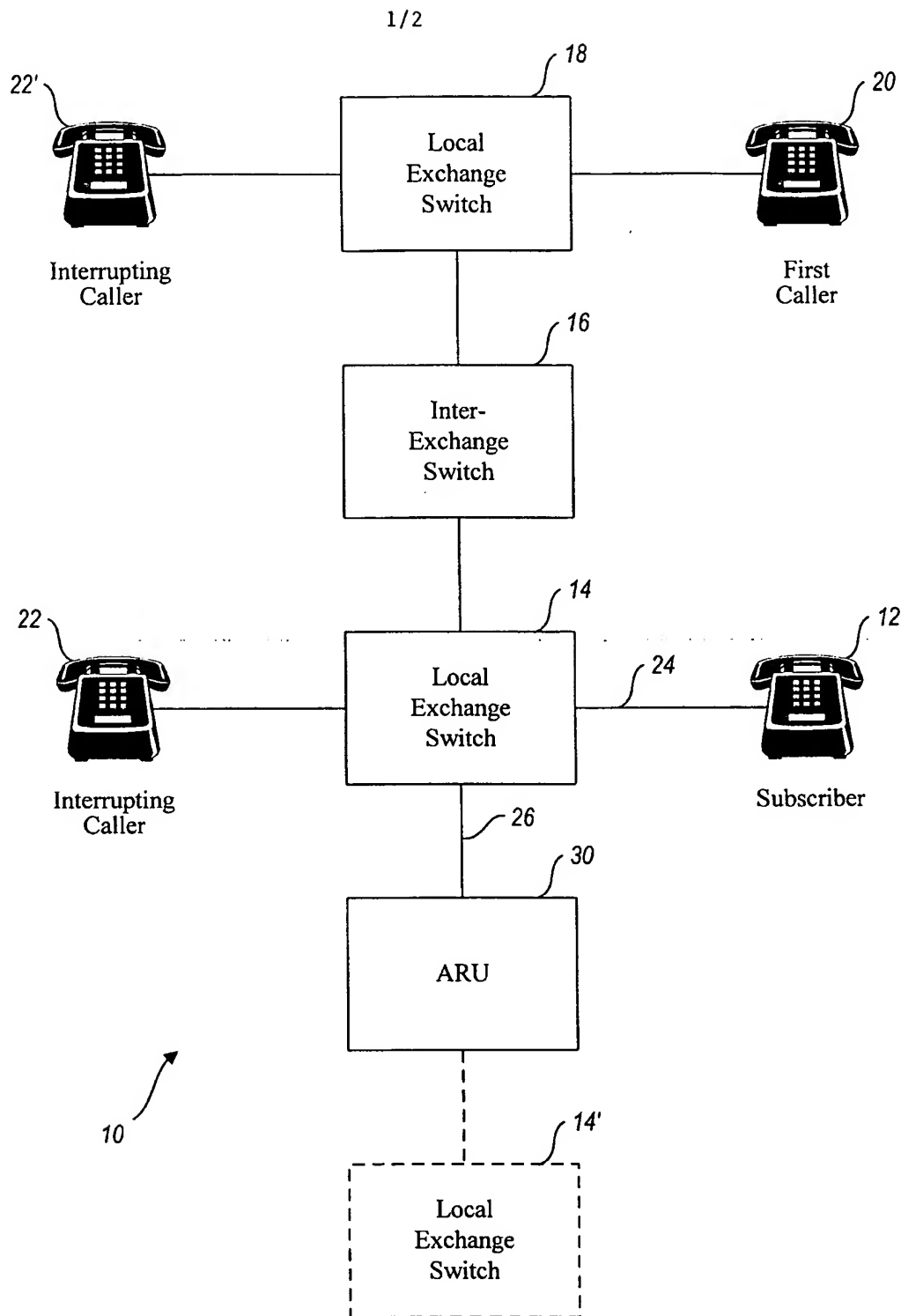
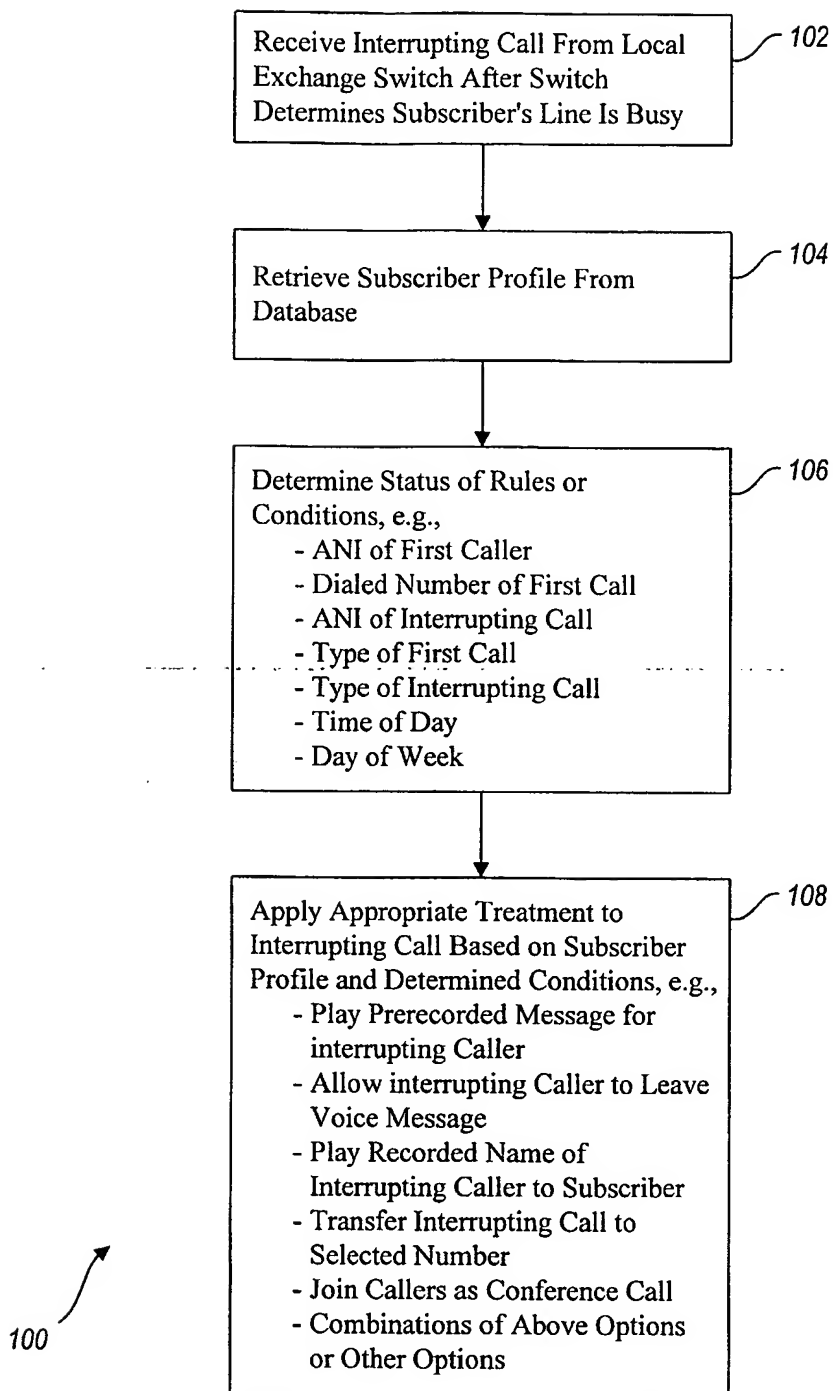


Fig. 1

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**Fig. 2**

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/09926

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M3/42 H04M3/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| Y | see column 2, line 34 - column 3, line 50 see column 5, line 31 - column 6, line 21 --- -/-- | 3,5,9, 15,21, 31,37,43 |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Int. Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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